Statistics 312 – Probability and Statistics for Engingeering
Fall 2014
Class TR 10:50am

Instructor: Dr. Kathy Ensor; x4687; ensor@rice.edu
Office Hours: Monday 2pm to 3:30 or by appointment

Course Objectives: To educate students on the fundamentals of probabilistic and statistical reasoning and problem solving. Successful students will leave the course with both a strong foundation and a working knowledge of statistics and probability used in the practice of engineering.

TA: TBA
Help Session: TBA
Office Hours: TBA

Textbook: Probability Concepts in Engineering 2nd Edition
Alfredo H-S. Ang and Wilson H. Tang
ISBN: 0-471-72064-X
** The book costs about $140. If you check Amazon, you can find the book for about $40-$50 used and get free 2 day prime shipping for college students.**

In the past, students do not necessarily appreciate the selected text. This text is chosen for its practical examples and is the standard in top CEVE programs around the country. Examples will go beyond those in CEVE to general engineering problems. You may want to have access to an additional text that covers basic probability and statistics. The texts used in STAT 280, STAT 305 or STAT 310 would all serve as good secondary sources. Also, there is generally excellent material on-line and I will provide lectures and notes for the class.

For a text covering the computing language R as well as basic statistics, Introductory Statistics with R, 2nd edition by Peter Dalgaard, is worthwhile.

Computing Required: *Matlab or R.* There will be computational exercises throughout the class. You can work in either Matlab or R. Examples will be provided in both languages throughout the course. I suggest you pick one language and use it throughout. An advantage to R is that it is open source and thus freely available (see http://www.r-project.org/). Further, RStudio provides an environment for working with R similar to Matlab (http://www.rstudio.com); again open source. The TA will be available to assist you with computing questions in Matlab and R.

Assessment:

- The Rice Honor code is in force on each exam and assignments (see details on homework and quizzes below). All potential infringements of the honor code will be submitted for review as designated by Rice policy.

- 60% Tests – given under strict adherence to the honor code
  - Test 1 --- Oct. 10th (closed book - evening to allow more time)
  - Test 2 --- November 20th (Take home test due Tuesday Nov. 25th by 5pm. Test will be available for download from Owlspace by noon on Monday Nov. 24th). Electronic submissions of a single file accepted via owlspace only.
  - **Optional Comprehensive** Final Exam. The final may used to replace your lowest test grade.
- 30% Homework and Quizzes
  - Ten assignments are planned for the semester.
  - Assignments will be due at the beginning of class on the due date.
    - For late work, 10% deduction occurs if handed in after class and before 5pm; 20% deduction for each day the assignment is late.
  - Assignments may be followed by announced quizzes.
  - Students are encouraged to discuss and collaborate on homework, however, solutions must be written individually unless otherwise indicated. All references to outside materials used should be included as part of the assignment. Also, include on each assignment a list of individuals with whom you discussed the problems.
  - Makeup homework and quizzes will not be accepted in general.
- 10% Project – may be in groups of up to 3 people
  - Project plan due --- November 13th
  - Written paper 5 to 10 pages due Friday December 5th by 5pm (submitted via owlspace). Poster presentation in the last week of classes (time TBA)

Attendance: Although attendance is not formally required the material is difficult and regular attendance is highly beneficial. An outline of the lectures is included on Owlspace; students who miss class are encouraged to get a copy of complete notes from a fellow student. There will not be make-up work for missed in class assignments or quizzes. The late policy on homework applies whether a student attends class or not.

Disabilities: I encourage any student with a disability that requires accommodation to let me know as well as Disability Support Services in the Allen Center.

Project: This project requires a 5-10 page professional report. If the project is by a group, the effort of each individual in the group must be clearly identified in an appendix to the paper. Two project styles are accepted:

1. **Investigating a problem of interest.** Your investigation must include observational data (or probability based simulations) and incorporate statistical/probablistic reasoning and techniques covered in the course. In this case, your report should include:
    a. abstract summarizing the problem and findings
    b. clear statement of problem being studied
    c. source of information available to answer the problem (e.g. the data, procedure, software)
    d. discussion of statistical and/or probabilistic methodologies used to solve the problem including an explicit statement about your statistical/probabilistic assumptions
    e. discussion of any shortcomings in the data or procedure
    f. summary of findings or conclusion
2. **Review articles** using the application of basic statistics and probability to address a problem. Base your review article on two or more sources from the public press or the scientific/engineering/social science/medical literature. Your review article should include:
    a. An abstract summarizing the problem and findings
    b. A clear statement of the problem studied
    c. The basic probability and statistical methodologies used and their assumptions
    d. How the chosen methodologies support the conclusions
    e. Directly address all assumptions on which the conclusions are based. Comment on the validity of these assumptions.
    f. Your review article should not simply summarize previous articles but from provide an informed commentary on the reported findings.

Project grading rubric (subject to change but will be announced if so):

- 10% Project plan
- 30% Validity/correctness of conclusions or findings
- 30% Manuscript/Poster: Organization / style / clarity / grammar / spelling
- 30% Communication of statistical concepts and findings including graphical summaries
- Note – members of a group may receive different grades if individual contributions are uneven or unclear.